Research Article

Orthodontic treatment needs of children living in orphanage according to the Dental Aesthetic Index (DAI)

Abstract

Objective: The study was conducted to determine the prevalence of orthodontic treatment needs among orphan children as the prevalence malocclusion is common among this population due to high occurrence of malnourishment.

Methods: The sample consisted of 158 orphans with the age group ranging from 11 to 13years from different orphanage Institutes using simple random sampling technique. Dental Aesthetic Index (DAI) was used to record orthodontic treatment needs. The Statistical software namely SPSS version 15.0 was used for the analysis different parameters at p value <0.05.

Results: Overall DAI was found to be very high i.e. 23.92 ± 5.568 and was more seen in girls. 79.7% orphans had crowding and 42.2% subjects were having diastema between incisors. Maxillary and mandibular anterior teeth irregularity was observed among 67.2% and 78.4% orphans respectively and 41.1% had a normal anterior posterior molar.

Conclusion: The severity of malocclusion and orthodontic needs were more among this group of population due to different factors. Hence careful planning based on feasibility is essential for the creation of appropriate solutions.

Keywords: dental aesthetic index, malocclusion, orphans

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Introduction

The major proportion of Indian population resides in rural regions of the country and out of which more than 40% of population is of younger age group.[1] This strength of a country should be in a healthy, educated and well developed environment as these children grow up one day and will be productive citizens of the nation.[2] Nutrition plays a major role in maintaining health of children while malnutrition appears to generate vulnerability.[3] Malnutrition is a multifactorial disease that can have an early onset during intrauterine life or childhood or can occur during an individual's lifetime as a result of poor nutrition and/ or repeated episodes of infectious or chronic diseases.[4] Malnutrition due to hunger and inadequate nutritious food intake makes children anemic, weak and prone to diseases and according to many scholars, most affected among them include a deprived and isolated section of the society called the orphans.[3] Health problems of children living in orphanage can be complex and clearly related to the living conditions in the institution.

Children in orphanage are often abandoned by their families as infants, toddlers, or even at school age. Children mainly undergo depression that sometimes results leads to immune inhibition and place children at increased risk for many infectious, contagious, communicable diseases that result in malnutrition and leads to risk of poor health and immunity.[2] The association between malnutrition and impaired growth and the development of facial bones has been reported by a number of researchers and has been linked to a reduction in the length of the skull base and jaw height.[5] There have also been reports of variations in maxilla mandibular width, lower facial height and dental and skeletal ages[6] as a result of malnutrition. Moreover, malocclusion comes next to dental caries among children and young adults concerning oral health.[7] The incidence of dental malocclusion differs from one country to another in relation to age and gender wise. The prevalence of malocclusion in India ranges from 20%-43% among school going children as mentioned by many studies.[1,8] There are different studies conducted regarding oral health status and treatment needs of handicapped, mentally challenged, institutionalized children[9] and children comes in lower socioeconomic status class[8,10] but the data regarding same in orphan population is deficient. Hence the present study was planned to the intensity of malocclusion treatment needs among this special group of population.

Methodology

The epidemiological study was performed to know prevalence of malocclusion and orthodontic needs among 11-13 year age group orphans by Dental Aesthetic Index. Four orphanage Institutes were surveyed from Jammu.

Criteria of selection

Orphan children between the mentioned age group and free of any serious illness were included. Children who were uncooperative were excluded and a sample size of 158 subjects was finalized. A pilot study was conducted among a group of 10 children in order to ensure the degree of repeatability of data (Cronbach alpha=0.80).

Examination

A proforma was designed using WHO Oral Health Assessment Form (1997). Full mouth clinical examination was carried using mouth mirror and explorer under natural day light. Overjet and overbite of dentition was examined with William's probe. Dental Aesthetic Index (DAI) were used to calculate readings of different parameters.

The 10 DAI sections are as:

a. Missing visible maxillary and mandibular incisors

b. Canine and premolar

c. Crowding present in the incisal segment (number of crowded sextants 0, 1 or 2)

d. Spacing in the incisal sextant (number of spaced sextants 0, 1 or 2)

e. Maxillary midline diastema

f. Largest maxillary and mandibular anterior irregularity

g. Maxillary anterior overjet

h. Mandibular anterior overjet

i. Vertical anterior open bite

j. Antero-posterior molar relationship

i.e.,0 for normal, 1 for half cusp and 2 for full cusp. The scores of DAI components were subjected to a DAI regression equation model and the scores obtained from this equation were calculated as the score for evaluating the severity of malocclusion.[11]

Statistical analysis

A master chart in Microsoft Excel (2007) was prepared for data analysis. The Statistical software namely SPSS version 15.0 was used to analyze between gender and different age groups using independent student t-test and ANOVA test respectively. The level of significance used was 5% level.

Results

A total of 158 orphan children were included in the study, of which 61 were boys and 97 were girls. The age ranged from 10 to 13years which was again divided into four groups for convenience. A total of 40 children were examined among 10years age group; 44 among 11years age group; 38 among 12years age group and 36 among 13years age group. The present study observed that 15.2% of the subjects had missing anterior teeth. Crowding was more commonly found (79.7%) in orphans while spacing in 65.8% orphans. Diastema was also observed among 42.2% subjects. Maxillary and mandibular anterior teeth irregularity was observed among 67.2% and 78.4% orphans respectively. Maxillary anterior overjet was seen in 65.8% orphans as opposed to the mandibular overjet seen in 23.4% orphans. Out of the entire sample, 74.1% subjects found with no anterior open bite and 41.1% orphans had a normal anterior posterior molar relation as mentioned in (Figure 1). According to dental aesthetic index cut-offs, normal malocclusion with minor treatment needs (DAI 13–25) was seen among 67.1% subjects, definite malocclusion along with elective treatment need (DAI 26–30) in 17.1%, severe malocclusion with highly desirable treatment need (DAI 31–35) in 12.7% and

very severe malocclusion with mandatory treatment need (DAI≥36) in 3.1% (Figure 2). Gender wise, the distribution of dental aesthetic index was more among girls (p=0.111) (Table 1). According to age, the highest DAI score was registered among 11years age group and lowest with 12years age group (Table 2).
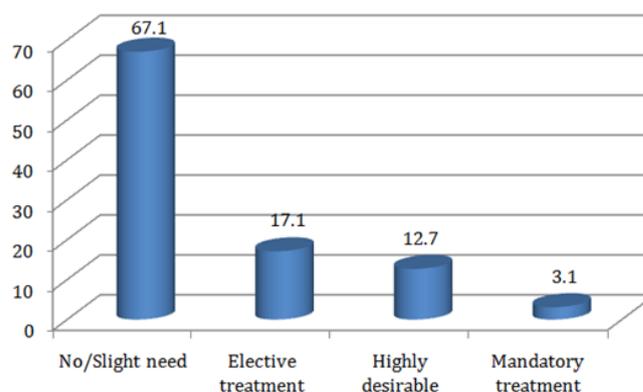

Figure 1 Orthodontic treatment needs of study population using dental aesthetic index.
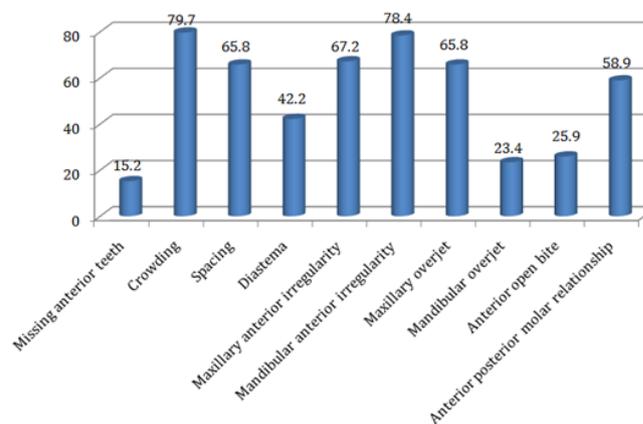

Figure 2 Showing components of dental aesthetic index.

Table 1 DAI scores according to gender using student t-test

Gender	No	Mean	Std. Deviation	p-value
Boys	61	23.03	5.269	0.111**
Girls	97	24.48	5.703	

Table 2 DAI scores according to different age groups using ANOVA test

Age groups	No	Mean	Std. Deviation	F-value	p-value
10 years	40	23.62	5.056		
11 years	44	25.70	4.292		
12 years	38	22.84	5.871	1.768	0.156**
13 years	36	24.32	6.493		
Total	158	23.92	5.568		

Discussion

Dental Aesthetic Index is one of the orthodontic indexes used for socially definite aesthetic standards. This DAI is a regression equation that connects mathematically the public's observation of dental esthetics with the purpose of physical measurements of occlusal traits related to malocclusion. It is simple, reliable, valid, and relatively fast and accounts for both function and aesthetics. Hence DAI can be useful as well as a reliable and equitable indicator for malocclusion.[12] It has been adopted by the WHO, making it as internationally accepted index and it has decision points that differentiate treatment priorities.[13] The frequency of orthodontic treatment needs decreased with the increase in the severity of malocclusion and these results were similar in other studies.[14,15] DAI scores≤25 was seen among most of the children (67.1%) and the results were comparable to studies National Oral Health survey and fluoride mapping-India[16] and Nelson et al.[17] whereas authors of other studies had shown lesser results.[18,19] The reason for this difference in DAI scores could be due to inherited difference in tooth size and arch size. The results for the DAI scores 26-30 are parallel to the studies of Onyeaso CO.[20] and Garcia et al.[21]

For DAI scores 31–35 and DAI≥36, the results were 12.7% & 3.1% respectively which were comparable higher to Shivkumar et al.[22] But the study by Ast et al.[23] by using Angle's criteria's showed severe type of malocclusion. This variation could be due to the difference in the criteria's for recording prevalence of malocclusion by using different types of malocclusion indices. Over all DAI was more among orphans than the general school children that refer to many factors as diet, malnutrition, adverse habits etc.[21] Missing anterior teeth was found among 15.2% of the study population and the results were higher than study done by Rao et al.[24] Crowding was the most common finding in this study i.e.79.7%. It worsens the permanent teeth eruption and it continues to increase as the age progresses.[18] Incisal segment spacing is the condition in which the space exists between the left and right canine, exceeds than in the normal alignment. Both spacing and midline diastema was higher in this study than the outcomes of Shivkumar et al.[22] This difference might be attributed due to involvement in parafunctional habits such as mouth breathing, thumb sucking, brauxism and obviously such habits are more common among the study children as they are lack of parental care and dental health education.[25]

The present study showed maxillary and mandibular anterior irregularity as 67.2% and 78.4% respectively and the findings were similar with Otuyemi et al.[19] study. Most of the study participants had maxillary overjet than mandibular and the results were comparable to other studies.[13] The anterior to posterior molar relationship is mostly depends on the relationship of permanent upper and lower first molars. Both the left and right sides were assessed with the teeth in normal occlusion. Above 50% of the study participants had half cusp and full cusp deviation from normal occlusion and the results were higher than Sureshbabu et al.[26] The present data showed higher mean DAI score among girls than boys that might be due to difference in their adverse habits such as mouth breathing, nail biting, tongue thrusting and thumb sucking etc. However the findings of present study were in contrast with results of previous data.[27]

Conclusion

DAI was more among orphans than the general school children and many factors play an important role in this such as diet, malnutrition, adverse habits. The prevalence of malocclusion and severity of treatment needs was more among girls compared to boys. Around 33% of orphans required different kinds of orthodontic treatment needs. So, this special group of children should be educated about the problems related malocclusion and health sector should made orthodontic treatments accessible to them.

Conflicts of interest

Authors declare that there is no conflict of interest.

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